AMENDMENTS TO THE CLAIMS

Please cancel Claims 8, 13, 21 and 42-54.

Please amend Claims 1, 9, 11, 14, 19, 22-23, 25-27, 29-30 and 32-34.

1. (Currently Amended) A process for forming a conductive element, comprising:

providing a semiconductor substrate;

depositing a sacrificial material over the substrate, wherein the sacrificial material comprises a metal or an organic material;

forming an insulating layer over the sacrificial material;

forming an opening through the insulating layer to partially expose the sacrificial material;

selectively removing the sacrificial material to form a buried open volume; and

simultaneously depositing a conductor in the buried open volume and the opening to form the conductive element.

2. (Original) The process of Claim 1, wherein simultaneously depositing the conductor comprises performing atomic layer deposition.

3. (Original) The process of Claim 1, wherein simultaneously depositing the conductor comprises simultaneously completely filling the open volume and the opening with a conductor.

4. (Original) The process of Claim 1, further comprising depositing the sacrificial material into the opening, forming an additional insulating layer over the opening and forming an additional opening in the additional insulating layer before selectively removing the sacrificial material.

5. (Original) The process of Claim 4, further comprising depositing a barrier layer by atomic layer deposition after forming an additional opening and before simultaneously depositing the conductor.

6. (Original) The method of Claim 4, wherein the opening is a via and the additional opening is a trench.

7. (Original) The method of Claim 1, wherein the sacrificial material completely fills the open volume before being selectively removed.

8. (Canceled).

9. (Currently Amended) The process of Claim [[8]]1, wherein the sacrificial material comprises a metal, wherein the metal comprises aluminum.

10. (Original) The process of Claim 9, wherein selectively removing the sacrificial material comprises etching the metal with chlorine gas.

11. (Currently Amended) The process of Claim [[8]]1, wherein the sacrificial material comprises a metal, wherein the metal comprises nickel.

12. (Original) The process of Claim 11, wherein selectively removing the sacrificial material comprises etching the metal with carbon monoxide gas.

13. (Canceled).

14. (Currently Amended) The process of Claim 13, wherein the sacrificial material comprises an organic material, wherein the organic material comprises a photoresist.

15. (Original) The process of Claim 14, wherein selectively removing the sacrificial material comprises stripping away the sacrificial material by wet ashing.

16. (Original) The process of Claim 15, wherein stripping away the sacrificial material by wet ashing comprises reacting the sacrificial material with a sulfuric acid and hydrogen peroxide solution.

17. (Original) The process of Claim 14, wherein selectively removing the sacrificial material comprises stripping away the sacrificial material by dry ashing.

18. (Original) The process of Claim 17, wherein stripping away the sacrificial material by dry ashing comprises reacting the sacrificial material with an ozone or an oxygen plasma.

19. (Currently Amended) ~~The process of Claim 1,~~ A process for forming a conductive element, comprising:

providing a semiconductor substrate;

depositing a sacrificial material over the substrate, wherein the sacrificial material comprises a material that can be sublimed below about 400°C;

forming an insulating layer over the sacrificial material;

forming an opening through the insulating layer to partially expose the sacrificial material;

selectively removing the sacrificial material to form a buried open volume; and

simultaneously depositing a conductor in the buried open volume and the opening to form the conductive element.

20. (Original) The process of Claim 19, wherein the material comprises antimony trioxide (Sb_2O_3) or tellurium (Te).

21. (Canceled).

22. (Currently Amended) The method of Claim [[21]]26, wherein the buried open volume comprises a plurality of contiguous trenches and vias.

23. (Currently Amended) The method of Claim [[21]]26, wherein substantially filling the open volume comprises performing chemical fluid deposition, with the conductor dissolved in a supercritical fluid.

24. (Original) The method of Claim 23, wherein the supercritical fluid used in chemical fluid deposition is supercritical carbon dioxide and wherein the conductor is dissolved in the supercritical fluid at a temperature of about 60°C and a pressure of about 150 bar.

25. (Currently Amended) ~~The method of Claim 21,~~ A method of semiconductor processing, comprising:

providing a partially fabricated integrated circuit having a top surface and a generally vertical opening leading to a buried open volume, wherein the buried open volume extends laterally beneath the top surface; and

forming a conductive line under the top surface by substantially filling the buried open volume with a conductor, wherein substantially filling the open volume comprises depositing the conductor by atomic layer deposition.

26. (Currently Amended) ~~The method of Claim 21,~~ A method of semiconductor processing, comprising:

providing a partially fabricated integrated circuit having a top surface and a generally vertical opening leading to a buried open volume, wherein the buried open volume extends laterally beneath the top surface; and

forming a conductive line under the top surface by substantially filling the buried open volume with a conductor, wherein forming a conductive line comprises depositing a metal selected from the group ~~comprising~~ consisting of copper, silver and gold.

27. (Currently Amended) ~~The method of Claim 21,~~ A method of semiconductor processing, comprising:

providing a partially fabricated integrated circuit having a top surface and a generally vertical opening leading to a buried open volume, wherein the buried open volume extends laterally beneath the top surface; and

forming a conductive line under the top surface by substantially filling the buried open volume with a conductor, wherein forming a conductive line comprises filling the open volume with a conductive polymer.

28. (Original) The method of Claim 27, wherein the conductive polymer is chosen from the group consisting of polyaniline, polypyrrole, polythiophenes and iodine doped polyacetylene.

29. (Currently Amended) ~~The method of Claim 21,~~ A method of semiconductor processing, comprising:

providing a partially fabricated integrated circuit having a top surface and a generally vertical opening leading to a buried open volume, wherein the buried open volume extends laterally beneath the top surface; and

forming a conductive line under the top surface by substantially filling the buried open volume with a conductor, wherein forming a conductive line comprises forming a wire comprising carbon nanotube bits, wherein forming the wire comprises:

suspending the carbon nanotube bits in a supercritical fluid to form a carbon nanotube mixture;

introducing the mixture into the open volume;

removing the supercritical fluid by vaporization; and

applying a weak electric field to join the carbon nanotube bits together.

30. (Currently Amended) ~~The method of Claim 21,~~ A method of semiconductor processing, comprising:

providing a partially fabricated integrated circuit having a top surface and a generally vertical opening leading to a buried open volume, wherein the buried open volume extends laterally beneath the top surface; and

forming a conductive line under the top surface by substantially filling the buried open volume with a conductor, wherein forming a conductive line comprises:

forming a nanometal slurry by suspending a nanometal powder in a supercritical fluid;

introducing the slurry into the open volume;

removing the supercritical fluid by decreasing a pressure of an ambient atmosphere of the partially fabricated integrated circuit;

subsequently sintering the nanometal powder by heating the partially fabricated integrated circuit to a temperature between about 200°C and about 300°C.

31. (Original) The method of Claim 30, wherein the nanometal powder consists of particles having a diameter of about 1-3 nm, particles having a diameter of about 5-8 nm and particles having a diameter of about 10-20 nm.

32. (Currently Amended) ~~The method of Claim 21,~~ A method of semiconductor processing, comprising:

providing a partially fabricated integrated circuit having a top surface and a generally vertical opening leading to a buried open volume, wherein the buried open volume extends laterally beneath the top surface; and

forming a conductive line under the top surface by substantially filling the buried open volume with a conductor, wherein the conductor comprises polaron threads.

33. (Currently Amended) The method of Claim [[21]]26, wherein the partially fabricated integrated circuit comprises at least two wafers bonded together.

34. (Currently Amended) A method of semiconductor processing, comprising:

providing a semiconductor wafer having a sacrificial material, wherein the sacrificial material extends horizontally underneath a top surface of the wafer;

removing the sacrificial material to form an opening, wherein the opening spans more than one fabrication level; and

depositing at least one monolayer of a material within the opening, wherein a cross-sectional area of the opening increases with decreasing distance to the top surface.

35. (Original) The method of Claim 34, further comprising depositing a diffusion layer after removing the sacrificial material and before depositing at least one monolayer.

36. (Original) The method of Claim 35, wherein the diffusion layer is deposited by atomic layer deposition.

37. (Original) The method of Claim 35, wherein the diffusion layer comprises tungsten nitride carbide.

38. (Original) The method of Claim 35, wherein the at least one monolayer comprises copper, silver, gold or a polymer.

39. (Original) The method of Claim 34, wherein the material is conductive.

40. (Original) The method of Claim 39, wherein depositing at least one monolayer of a material comprises depositing monolayers until the opening is filled with the material.

41. (Original) The method of Claim 39, wherein depositing at least one monolayer of a material forms a conductive line for connecting electrical devices.

42-54. (Canceled).